

No. 10.—*Two new Genera of Sea-Urchins.*

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THERE have recently come to the Museum, in one case as a donation and in the other on deposit, two remarkable Echini, each of which seems to represent an undescribed species, and in each case the combination of characters shown prevents its being assigned to any recognized genus. It is therefore necessary to erect new genera for their reception. One of the specimens is a bare test of a recent species from the China Sea, while the other is a well-preserved fossil from South Carolina.

The recent specimen was sent me some months ago by Monsieur P. Thiéry, of Pont-a-Mousson, France, who asked me to identify it. The specimen had been in his collection for several years and during the war was struck by a fragment of a German shell and its abactinal side seriously damaged. Examination of the specimen puzzled me and I returned it to M. Thiéry with the suggestion that it represented a new genus and advising him to publish a description of it. With characteristic but none the less extraordinary generosity he sent it back, presenting it to the Museum of Comparative Zoölogy, with the request that I describe it.

Before doing so I felt it was desirable to have my friend Dr. Mortensen of Copenhagen see it for there is no one now living whose judgment regarding Echini, I value as highly as that of my Danish colleague. Dr. Mortensen promptly returned the specimen with the assurance that it seemed to be a new genus (*vide infra*), and I therefore publish a full account of the specimen, making it the type of a new genus, *DESMECHINUS*¹ and designating it by the specific name, *anomalous* in reference to the unusual combination of characters which it shows. It may seem ungracious not to associate M. Thiéry's name in some way with this interesting echinoid, particularly in view of the admirable work he has done on the group, but I hope to be pardoned in my endeavour to make whatever names I coin significant, at least to some degree, of the animal with which they are to be associated.

¹ Gr. *δεσμός*, a connecting link + *echinus*, indicative of the apparently intermediate position it occupies between the Temnopleuridae and Echinidae.

DESMECHINUS, gen. nov.

Temnopleurids of the subfamily Trigonocidarinae, with a much flattened, sculptured test, the larger primary tubercles crenulate, and the periproct markedly eccentric, in contact with oculars I and II, and genital 1.

Genotype: The following unique species

DESMECHINUS ANOMALUS, sp. nov.

Test flattened, with circular ambitus, 39 mm. in diameter and only 13 mm. high. There are 22 interambulacral plates in each column and 32 ambulacrals; the damaged condition of the abactinal system prevents certainty regarding these numbers. The abactinal system is about 10 mm. across, but only three oculars (II, III and IV) and two genitals (2 and 3) are present, the entire posterior part of the system with its adjoining coronal plates being broken away. There is a part of genital 1, with more than half the pore still adhering to the periproct, but genitals 4 and 5 are not to be found, while ocular V is entirely missing and of ocular I there is only a minute fragment. The anal plates are present and in position, and there is little reason to doubt that the undamaged abactinal system would have appeared exactly like that of *Gymmechinus*, oculars I and II and genital 1 being in broad contact with the periproct, while the other oculars were very markedly exsert. Genital 2, the madreporite, is conspicuous with its entire surface slightly swollen and very fully occupied by the numerous madreporic pores. Genital 3 carries 4 or 5 rather large, secondary tubercles.

Interambulacral areas about 14 mm. wide at the ambitus; each plate carries a primary tubercle and on either side of it (at the ambitus) are 2-4 secondary tubercles; a typical arrangement is for two secondary tubercles to stand on each side of the primary and in line with it, those on the inner side being almost or quite as large as the primary; there are also about 30 miliary tubercles of various sizes, so the plate-surface is very fully covered. Of course both above and below the ambitus, the number of tubercles decreases as the poles are approached. In addition to the tubercles, the surface of the interambulacral plates carries pits, grooves and lines of varying depth and irregular arrangement. The most conspicuous pits are 2 or 3, along the lower margin of the inner half of the plates, and 1 or 2 below the primary tubercle, especially on its inner side. The inner ends of the abactinal inter-

ambulacral plates are free from tubercles or markings but are very slightly bevelled so that there is a zigzag median line in the inter-radius; the inner ends of the upper and lower margins of the plates are also slightly bevelled. Many, but not all, of the larger tubercles, especially on the actinal surface, are crenulated, some of them very conspicuously so. The tubercles are, of course, imperforate.

Ambulacral areas about 10 mm. wide at ambitus; each plate carries, at or near its center, a conspicuous primary tubercle; each of these tubercles is connected with its fellows on the plates above and below by a narrow but conspicuous vertical ridge, on the inner side of which is a series of big pits; at the ambitus and above, one of these pits occu-

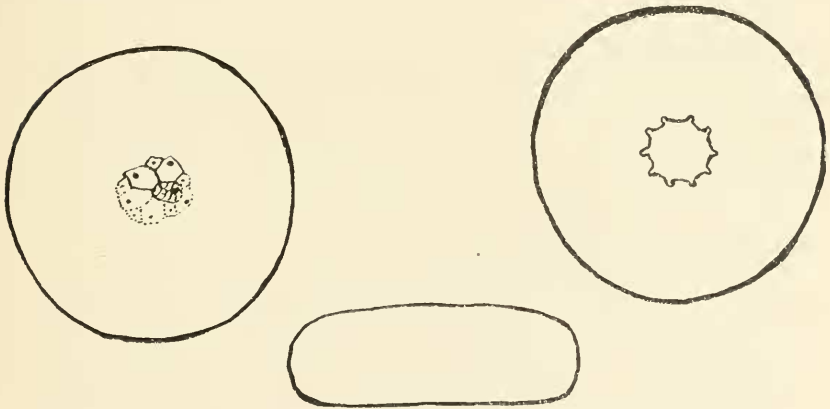


FIG. 1. Outlines of *Desmechinus anomalus*. Nat. size. From above, from the side, from below, to show proportions of height, periproct, and peristome, to diameter.

pies all the space between the tubercles of adjoining plates, but below the ambitus the pits soon disappear and the ridge itself does not extend half way to the peristome. Near the inner end of each plate is a tubercle which may perhaps best be regarded as a secondary but in the midzone it is nearly or quite as big as the primary. There are also 8-10 miliary tubercles scattered on the inner half of each plate and among these are a few small and more or less indefinite pits. Along the median radial line, the plates are a trifle bevelled with here and there a small pit; there are pits also, some of them rather conspicuous, along the horizontal sutures between the ambulacral plates. The primary tubercles, except abactinally, are generally crenulated. The outer half of each plate is occupied by the poriferous area, which is

over 2 mm. wide at the ambitus. The arcs of 3 pore-pairs are very regular and in the midzone are so well spaced that the first pore-pair on each plate (the innermost) is directly above the first on the plate below, the second is above the second and the third is above the outer half of the second and most of the third. Immediately above each pore-pair is a tubercle; that above the first one is largest but least overhanging; the other two are nearly white, translucent (at least to some degree) and distinctly overhang the pores; the outermost pore-pair is often almost concealed by its tubercle; a miliary tubercle occupies the extreme upper, outer corner of the plate and a second one is on the lower margin between the first and third pore-pairs. Actinally the poriferous zones are narrower but the pore-pairs never form a single vertical series.

Peristome small and distinctly sunken, only 8.5 mm. across. Peristomal membrane missing. Gill-cuts deep and sharply defined with rather conspicuous flanges. Auricles rather conspicuous, but wide and low, not meeting across the ambulacra. Spines and pedicellariae wholly wanting. Color of bare test, above ambitus, dull purplish; somewhat yellowish on the poriferous areas, darkest on the median radial and interradial areas; lower surface of test cream-color. Holotype: M. C. Z. 4,635. China Sea.

This remarkable sea-urchin bears a striking resemblance to *Gymnechinus epistichus*, when seen from the upper surface. Actinally the resemblance is less striking because the peristome is so much smaller and more sunken. In *epistichus* the diameter of the peristome is more than a third of the horizontal diameter of the test, while in the present specimen it is less than one fourth. The test too is much flatter than in *epistichus*. Nevertheless, were it not for the sculpturing of the test, I should consider this Chinese sea-urchin, the adult of *epistichus*, for it is well known that the older and larger a regular sea-urchin becomes the smaller the peristome is proportionately, and, in species with low tests, the flatter they become. But to disregard the very evident sculpturing of the test involves confusion between two families (Echinidae and Temnopleuridae) which have hitherto been regarded by all students of Echini as perfectly distinct and natural groups. Except for the abactinal system, the new species is unquestionably a Temnopleurid. The abactinal system seems to be that of *Gymnechinus*, but the test of *Gymnechinus* shows no sculpturing. The holotype of *G. epistichus* (26 mm. h.d.) is one of the largest specimens of the genus on record and careful examination of its test with a lens reveals no sculpturing and no sign of crenulation on the tubercles.

Another sea-urchin which the new species suggests is *Opechinus spectabilis* Mortensen but the abactinal system and the poriferous areas are strikingly different. Dr. Mortensen, moreover writes:— "Regarding the Temnopleurid, I would say that I think it evidently a new genus. It seems related to *Opechinus* but the trigeminate pores, so distinctly developed, form so important a difference that I think they could hardly be congeneric."

We must choose then between the two horns of the dilemma. Either the present specimen represents the adult of *Gymnechinus epistichus*, the sculpturing of the test, supposed to be characteristic of the Temnopleuridae, being developed only after the urchin is two thirds grown, or we have the representative of a remarkable new Temnopleurid genus with an extraordinary resemblance to *Gymnechinus epistichus*. In view of the scanty material and its poor condition, it seems wiser to accept the latter alternative, as the acceptance of the former breaks down family lines and results in unfortunate confusion. It seems almost needless to add that if the first alternative is correct, as I think not at all unlikely, we shall have to make renewed efforts to delimit the Echinidae and the allied families.

The fossil echinoid from South Carolina belongs to Mr. William G. Mazÿck of Charleston, and he has kindly consented to my naming and describing it. Before doing so, I sent it to Dr. M. W. Twitchell, Assistant State Geologist of New Jersey, who has given special attention to the fossil Cassiduloids of North America. Dr. Twitchell kindly examined the specimen and wrote me: "I am quite confident you are correct in deciding that it is 'a new and well characterized Cassiduloid,' . . . I think it belongs to the family Cassidulidae but I am also quite positive that it should not be placed in the genus *Cassidulus*." After further discussion of its relation to other genera of the Cassidulidae, Dr. Twitchell expresses the belief "that you will have to establish and describe a new genus for your form — closely allied to *Cassidulus* on the one hand and to *Echinolampas* on the other." In view of this expert opinion I do not hesitate therefore to offer the following diagnosis of a new genus.

PYGIDIOLAMPAS.¹

Low, somewhat flattened Cassidulids with the abactinal ambulacra markedly petaloid, the petals nearly or quite closed; the peristome

¹ Πυγίδιον = "a thin, narrow rump" + *lampas*, the common termination of the names of several allied genera.

nearly central with a well-developed floscelle; the actinal surface flat with the ambulacra not at all depressed; and the periproct small, slightly longer than wide and completely on the actinal surface of a narrow posterior projection of the test.

Genotype: *Pygidiolampas eurynota*, sp. nov.

It may be that the posterior projection of the test is not a constant generic character, for the really essential features are the low test, the well-formed petals, the absence of any depressions for the ambulacra, the small elliptical periproct, wholly on the actinal surface without any trace of a depression or furrow about it. The position of the periproct is a sufficient difference between the new genus and *Cassidulus*, while the small size and the form of the periproct combine with the perfect petals and the flat actinal surface to distinguish *Pygidiolampas* from *Echinolampas*. The form and position of the periproct are strikingly suggestive of *Pygurus* but the form of the test and the character of the ambulacra are very different in the two genera. It is probable that the similar position of the periproct in *Pygurus* and *Pygidiolampas* is a case of parallelism rather than an indication of genetic affinity, for the characters of the ambulacra, which are certainly more fundamental than the position of the periproct indicate that *Cassidulus* is nearer the new genus than is *Pygurus*, and it is not unlikely that *Echinolampas* is even nearer. Very possibly some of the species now included in *Echinolampas* will be found to belong more naturally in *Pygidiolampas*.

As regards the geological age of the genus, we have no direct knowledge. Mr. Mazýček writes: "I am sorry that I cannot give you any information regarding the geological horizon. The geographical location is Grove Plantation, Cooper River, about 14 miles from Charleston." Clark and Twitchell (1915, *Mesozoic and Cenozoic Echinodermata of the United States*) consider the echinoderms which they record from this famous plantation as Upper Miocene, so there is every reason to believe that *Pygidiolampas* is an Upper Miocene form, and thus somewhat later than most of the American species of *Cassidulus*, though that genus has a very great geologic range.

PYGIDIOLAMPAS EURYNOTA, sp. nov.

Length 46 mm.; breadth, across peristome, 40 mm.; height, 14 mm. Ambitus sharply defined, at the margin of the flat actinal surface; the anterior half of the ambitus is a semicircle but the posterior half is a very broad V-shape, the point of the V projecting some-

what from the general curve of the margin. Abactinal system at apex of the test, distinctly anterior, its center only about 19 mm. from the anterior margin. There is a large pore, almost a millimeter in diameter, at the apex of interambulacrum 4 and this may fairly be considered a genital pore. It is clear that no such pore exists or ever did exist in interambulacrum 5. As for other interambulacra, the condition of the specimen does not permit determination. An ocular pore, nearly half a millimeter across, is present at the apical end of petal V but none of the others can be detected with certainty.

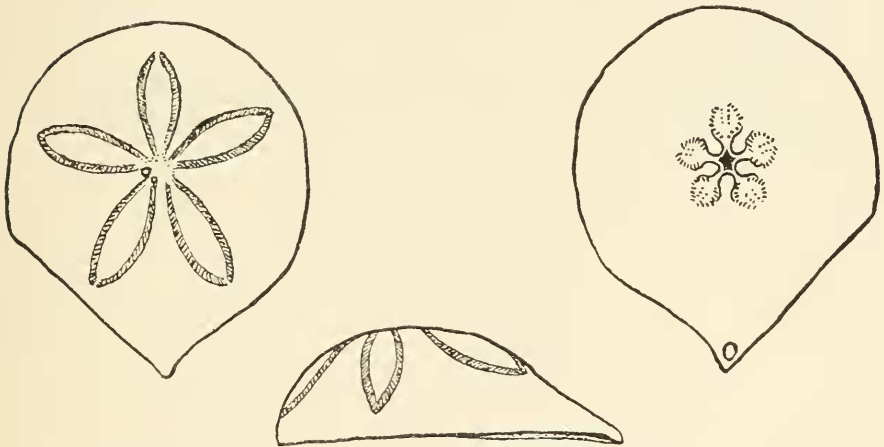


FIG. 2. *Pygidiolampas eurynota*. Nat. size. From above, from the side, from below.

The petaloid area occupies a large part of the abactinal surface; petals I and V are about 17 mm. long, 5.5-6 mm. wide at the middle with the interporiferous area, 3 mm. wide at that point; they taper almost equally towards each end and are nearly closed distally; the pores of each pair are apparently about equal in size and are connected by a deep groove; there are about 60 such grooves on each side of each petal. Petals II and IV are very similar but are shorter and wider, about 16 mm. long, 7 mm. wide, with interporiferous area about 4.5 mm. across. They have about 60 pore-pairs and are quite closed distally. Petal III is not essentially different, being 16 mm. long, 6 mm. wide, with interporiferous area about 3 mm. across; the distal end is damaged but it was undoubtedly nearly or quite closed. There is no tuberculation visible on the abactinal surface.

Actinal surface remarkably flat, with the bourrelets very conspicuously projecting around the mouth. Phyllodes short and wide, distal to the bourrelets and abruptly narrowed between them, not at all sunken below the actinal floor. Peristome small and nearly central. Ambulacra flush with the interambulacra, the boundaries between being almost indistinguishable. Interambulacrum 5 very slightly tumid, so that it is not so flat as the rest of the actinal surface. Periproct small, about 2.5 mm. long by a little more than 2 mm. wide, placed on the lower surface of the posterior projection of the test, close to the margin. Seen from the side, the projection seems to curve downward very slightly. No tuberculation is visible anywhere actinally.

The specimen is a dirty horn-color, more or less whitish on the upper surface, but the matrix in which it was imbedded was a dark gray in rather strong contrast.